



MEMORANDUM

To: Massachusetts Program Administrators (PAs) and Energy Efficiency Advisory Council (EEAC) Consultants

From: Lauren Abraham, Lisa Wilson-Wright, Michael Strom, and Jayne Piepenburg, NMR Group, Inc.

Date: April 12, 2017

Re: RLPNC 16-5 Sales Data Analysis Task 1f and Task 2c: Sales and Shipment Data Analysis

This memo presents trends in light bulb sales and market share in Massachusetts, New York, the nation, and program and non-program areas (defined below). The purpose of the effort is to understand the dynamics and direction of the residential lighting market. NMR obtained national- and state-level light bulb sales data from IRI and Nielsen via the CREED Initiative.^{1,2,3} IRI and Nielsen each offer a point-of-sale (POS) and a panel dataset. The POS datasets are composed of sales data reported by selected retailers, while the panel datasets are composed of purchases scanned by consumer panelists. These datasets, their characteristics, and their strengths and weaknesses are described in detail in the Data Sources section (especially Table 1) and Appendix A. The analyses in this memo include standard and specialty CFL, halogen, incandescent, and LED bulbs, and exclude other bulb types (e.g., linear fluorescents). The memo also includes a brief update on Second and Third Quarter 2016 Bulb Shipments, as reported by the Association of Electrical Equipment

¹ CREED serves as a consortium of program administrators, retailers, and manufacturers working together to collect the necessary data to better plan and evaluate energy efficiency programs. LightTracker is CREED's first initiative, focused on acquiring full-category lighting data, including incandescent, halogen, CFL, and LED bulb types for all distribution channels in the entire United States. As a consortium, CREED speaks as one voice for program administrators nationwide as they request, collect, and report on the sales data needed by the energy efficiency community. (<https://www.creedlighttracker.com>)

² The information contained herein is based in part on data reported by IRI through its Advantage service as interpreted solely by LightTracker, Inc. Any opinions expressed herein reflect the judgement of LightTracker, Inc., and are subject to change. IRI disclaims liability of any kind arising from the use of this information.

³ Data presented include LightTracker calculations based in part on data reported by Nielsen through its Strategic Planner and Homescan Services for the lighting category for the 52-week period ending approximately on December 31, 2015, for the Massachusetts and New York markets and Expanded All Outlets Combined (xAOC) and Total Market Channels. Copyright © 2016, Nielsen.

and Medical Imaging Manufacturers (NEMA).⁴ The memo suggests which of the CREED Initiative datasets the PAs and EEAC consultants should purchase in the future and for which areas.

Summary of Key Findings

This memo draws on five databases that describe sales and shipments of light bulbs, as described in more detail in Table 1. These data sources differ in terms of their coverage of the retail channels, the time series available, and identification of ENERGY STAR-qualified bulbs.⁵ The analysis compares bulb sales and market share trends for the nation, Massachusetts, and New York (which ceased supporting standard CFLs in 2012 and all bulbs in 2014), as well as the group of states offering programs and the group of states not offering programs, as identified by the CREED Initiative, with assistance from NMR. NY includes the entire state, not only the Upstate and Westchester County portions included in the on-site saturation studies, nor are the data weighted to resemble MA as they are in the on-site studies. Finally, there has been continued program activity on Long Island in NY. Program areas are defined as those with one or more active upstream lighting programs at any point between 2009 and 2015, and non-program areas lack all programs.

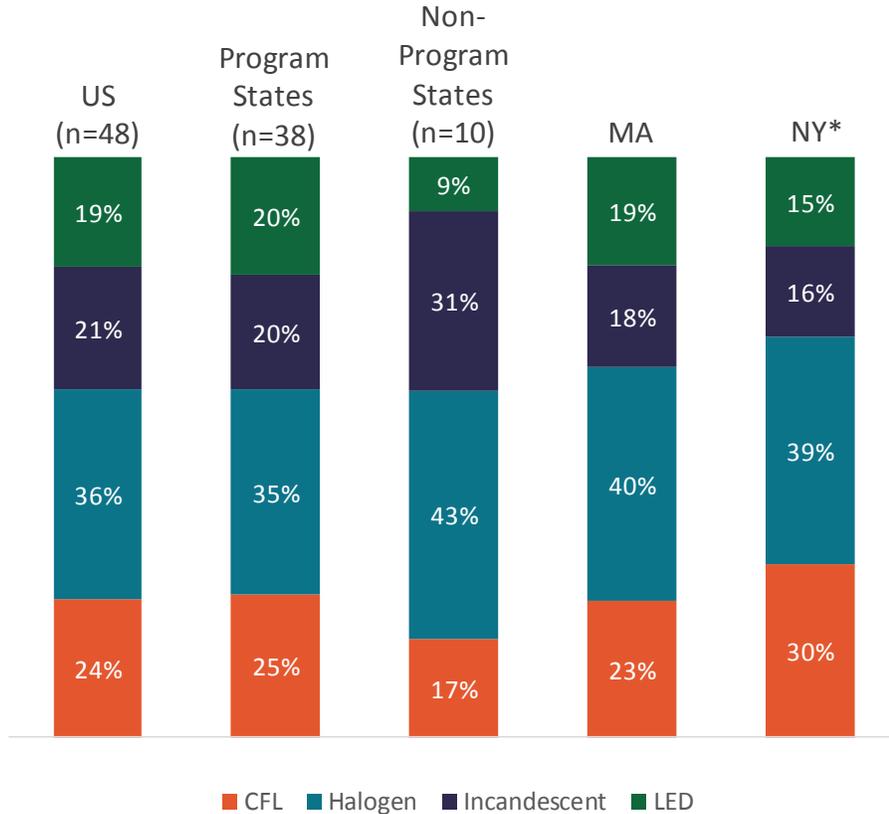
- **Based on the best estimate available, 2015 LED market share in Massachusetts was approximately 19%, comparable to all program states (20%) but higher than New York (15%) and non-program states (9%).**

After a thorough review of the datasets, the evaluation team and the CREED Initiative believe that the estimates of 2015 market share in Figure 1 represent the strongest estimates available for the US, program states, non-program states, MA, and NY. The data suggest that in 2015, market share for efficient bulbs (CFLs and LEDs) was greater in program states (45%) than in non-program states (26%). Market share for efficient bulbs was greater in MA (42%) than in non-program states (26%), but slightly less than in NY (45%). LED market share was higher in MA (19%) than in NY (15%), but CFL market share was higher in NY (30%) than in MA (23%).

⁴ NEMA "Lamp Indices." Accessed on February 22, 2017, at <http://www.nema.org/Intelligence/Pages/Lamp-Indices.aspx>

⁵ The team provides guidance on the retail channel coverage when presenting results.

Figure 1: 2015 Bulb Market Share in US, MA, & NY
 (All retail channels. 100% of market)



*Includes entire state of NY.

Longitudinal data suggest that lighting programs successfully boost energy-efficient bulb share, nationally and in MA. In contrast, more bulbs were sold through grocery, drug, dollar, discount, and mass merchandiser channels in non-program states (92 million bulbs) than through hardware, home improvement, lighting specialty, and membership channels (42 million bulbs). In all four areas included in Figure 2, a larger proportion of efficient bulbs was sold through the hardware, home improvement, lighting specialty, and membership channels (columns labeled 'B') than through the grocery, drug, dollar, discount, and mass merchandiser channels (columns labeled 'A').

Figure 2: 2015 Program States, Non-Program States, MA, and NY Market Share by Retail Channels

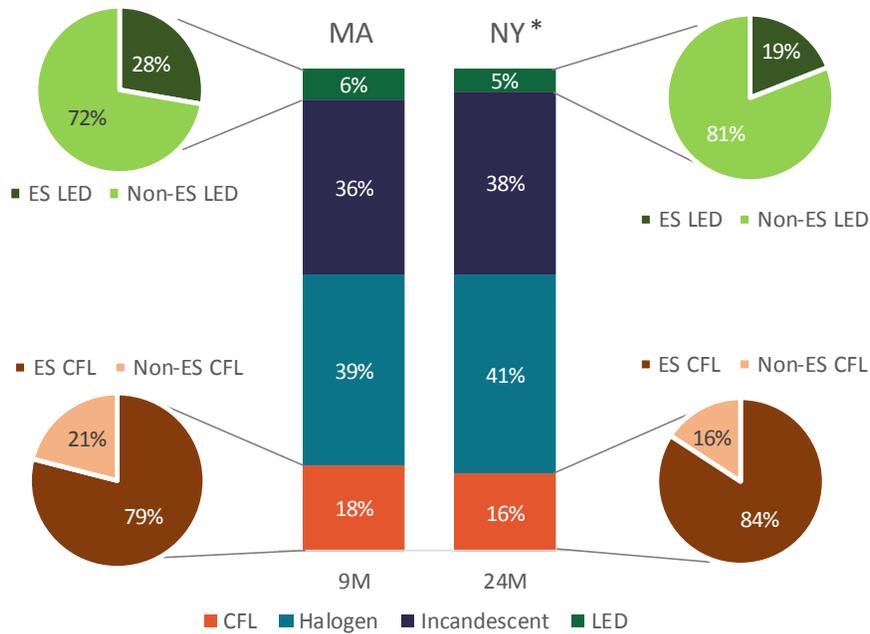


- ENERGY STAR LED bulb sales are increasing nationally and in MA and NY, although NY lags behind MA.

The evaluation team also reviewed estimates of the share of LEDs and CFLs purchased in 2015 that qualified for the ENERGY STAR Label (Version 1.2) in a subset of retail channels. Figure 3 suggests that most of CFLs sold in 2015 through grocery, drug, dollar, discount, and mass merchandiser channels in MA and NY were ENERGY STAR certified. However, just over one-quarter (28%) of LEDs sold through these channels in MA, and less than one-fifth (19%) of LEDs sold through these channels in NY, were ENERGY STAR certified.

Figure 3: 2015 ENERGY STAR Market Share in MA and NY

(Channels: Grocery, Drug, Dollar, Discount, and Mass Merchandisers. 48% of MA Market)



*Includes entire state of NY.

Additional key findings are summarized below, with details included in the main body of this memo.

- Point estimates of market share vary by data source, but they generally point to the same national lighting trends.

These national trends are for increased LED and halogen market shares and decreased CFL and incandescent market shares. Four of the five data sources suggest that halogens and LEDs accounted for about 50% of national market share in 2015. In 2011, the longitudinal datasets suggest that halogens and LEDs accounted for only 2% of the national market share. Only one dataset varies from this overall trend, suggesting that incandescents account for more than one-half of all purchases made by the households.

Although this divergent dataset includes all channels, the team was not able to perform as detailed a review of the raw data as for other datasets, so we cannot explain the reasons it differs.

➤ **General bulb sales and market share trends are consistent across study areas.**

Based on longitudinal data, bulb sales trends in MA, NY, and the US overall are as follows: Incandescent sales have declined since 2011, halogen sales have increased since 2012, LED sales have increased since 2014, and CFL sales have fluctuated since 2010. Since 2009, incandescent market share has declined, halogen and LED market shares have increased, and CFL market share has fluctuated.

➤ **Total bulb sales per household have been declining across the nation.**

As market share—and likely household saturation—of longer-life bulbs (CFLs, LEDs, and, to a lesser extent, halogens compared to incandescents) increased, the total number of bulbs sold has decreased across the nation and in every state we examined.

➤ **LED market share of NEMA shipments lost ground to halogens and incandescents in the second quarter of 2016, then rebounded in the third quarter.**

While CFLs continued their steady decline in shipment market share, LEDs saw their first contraction in Q2 2016 since NEMA began to track their market share in 2011, declining from 27% in Q1 to 21% in Q2. However, LED market share rebounded to 32%, and incandescent and halogen market shares receded (to 10% and 45%, respectively) in Q3 of 2016.

➤ **Comparison of the NEMA shipment and retailer market shares shows a lag for incandescents.**

NEMA incandescent market share declined precipitously during 2014 and has hovered at around 10% since Q4 of 2014. The longitudinal IRI POS data show a gradual decline in incandescent market share starting at around the same time. Our point estimate for 2015 national incandescent market share is 21%, still twice that of the 10% market share for 2015 NEMA incandescent shipments. One explanation for this lag in incandescent market share is retailer overstocking during the early phases of EISA.

➤ **The evaluation team suggests that the PAs purchase the same datasets for the 2016 calendar year, if Nielsen can provide greater detail on the ENERGY STAR qualification of the panel data.**

While each of the datasets has strengths and weaknesses, the evaluation team believes that the knowledge gained by having access to consistent estimates of total market share over time (IRI POS), market share estimates that include all channels (IRI panel), and those that distinguish ENERGY STAR from non-ENERGY STAR (Nielsen POS and possibly Nielsen panel, based on conversations between Nielsen and CREED) bulbs outweighs the drawbacks of these four datasets. Prices are provided in the main body of this memo. The PAs have adopted this suggestion.

Data Sources

Table 1 summarizes the characteristics of the five datasets used in this analysis, including IRI point-of-sale (POS) data, IRI panel data, Nielsen POS data, Nielsen panel data, and NEMA shipment data.

The POS data represent actual bulb sales as reported by retailers who agree to take part in the IRI and Nielsen data collection efforts. The panel data represent the reported purchases of individuals serving on consumer panels who scan the UPCs of all purchases they make at any type of retailer. The NEMA data come from a statistical survey of NEMA members. Reviews of the data made it clear that they often yielded conflicting estimates of bulb market shares. The CREED Initiative received guidance that the IRI and Nielsen datasets derive data from the same sources. Therefore, some of the variation between their datasets likely reflects differences in the cleaning and weighting methods used by IRI and Nielsen. The NEMA data reflect shipments and not sales and come directly from manufacturers, which may explain their variations, yet the CREED Initiative and NMR also identified other strengths and weaknesses of the sales datasets. While the strengths and weaknesses of the datasets are briefly summarized in Table 1, Appendix A includes more details.

In addition to strengths and weaknesses, each dataset also exhibited internal discrepancies. Since the panel datasets represent sales from all retail channels and the POS datasets represent sales from only a subset of retail channels, one would expect total sales, weighted to the population, in the panel datasets to exceed total sales in the POS datasets. However, total weighted sales in the panel datasets fell below those of the POS datasets. To correct for this, the team adjusted the IRI panel data, drawing on such information as NEMA shipments and the total square feet of POS retailers by state, among other factors. The same issue also arose in the Nielsen data; however, NMR opted not to expend the time and budget necessary to true-up the Nielsen panel data with the Nielsen POS data because the Nielsen panel data did not distinguish ENERGY STAR and non-ENERGY STAR qualified bulbs. Without this benefit, we did not believe the Nielsen panel data presented adequate improvements over the IRI panel data to justify the additional expenditures needed to adjust them.⁶ Therefore, we focus on the Nielsen POS data for distinguishing ENERGY STAR vs. non-ENERGY STAR bulbs and the IRI data for nearly all other analyses presented here.

Considering the various strengths and weaknesses, the team decided to rely on the following datasets for each of the specified purposes:

- IRI POS for discussion of bulb sales over time
- IRI POS and NEMA shipments for discussion of market share over time
- Adjusted IRI panel for additional reviews of 2015 market share and to serve as the strongest overall estimate of 2015 market share
- Nielsen POS data for assessments of ENERGY STAR market share

⁶ In short, we did not feel the value of the effort outweighed its cost.

Table 1: Summary of Data from Sources

	NEMA	IRI		Nielsen	
	Shipments	Point of Sale	Panel	Point of Sale	Panel
Years	Q1 2011 to Q2 2016	2009 - 2015	2015	2014 - 2015	2014 - 2015
States	US total	44 states	48 states	MA, NY, US total ²	MA, NY, US total ²
Shipments as reported by NEMA members	X				
Sales as reported by selected retailers		X		X	
Purchases scanned by consumer panelists			X		X
Ability to distinguish ENERGY STAR bulbs				X	
Channels Excluded		<ul style="list-style-type: none"> Hardware Home Improvement Some membership Lighting specialty Online sales 	None – all included	<ul style="list-style-type: none"> Hardware Home Improvement Some membership Lighting specialty Online sales 	None – all included
Key Strengths	<ul style="list-style-type: none"> Reported directly by manufacturers 	<ul style="list-style-type: none"> Actual sales data Detailed data descriptions to add data cleaning 	<ul style="list-style-type: none"> Detailed data descriptions to add data cleaning 	<ul style="list-style-type: none"> Actual sales data Detailed data descriptions to add data cleaning Flag for “endorsements” that include ENERGY STAR 	
Other Weaknesses ¹	<ul style="list-style-type: none"> Shipments, not sales Some manufacturers may not respond No state data 	<ul style="list-style-type: none"> No flag for ENERGY STAR Contract limits analysis, reporting 	<ul style="list-style-type: none"> Only single year of data Failure to scan all purchases No flag for ENERGY STAR Contract limits analysis, reporting Small sample sizes for some states 	<ul style="list-style-type: none"> Shorter time series (2014 and 2015) 	<ul style="list-style-type: none"> Shorter time series (2014 and 2015) Failure to scan all purchases No flag for ENERGY STAR Small sample sizes for some states

¹ Other than excluded channels.

² While Nielsen offers data for many states, the evaluation team recommended purchasing state-level data for MA and NY only to avoid redundancy with the IRI data and to conserve costs.

Bulb Sales Trends

The examination of bulb sales trends over time includes sales from the grocery, drug, dollar, and discount channels, and some mass merchandisers, representing about 48% of MA bulb sales according to the recent InfoScout survey.⁷ To allow for comparisons between areas on the same scale in this section, we normalized the data by dividing bulb sales in a given area by the number of households in that area. Figure 4 displays total US bulb sales by type per household, bulb sales for program states by type per household, and bulb sales for non-program states by type per household from 2009 to 2015.⁸ A program state is a state with one or more active programs at any point between 2009-2015.

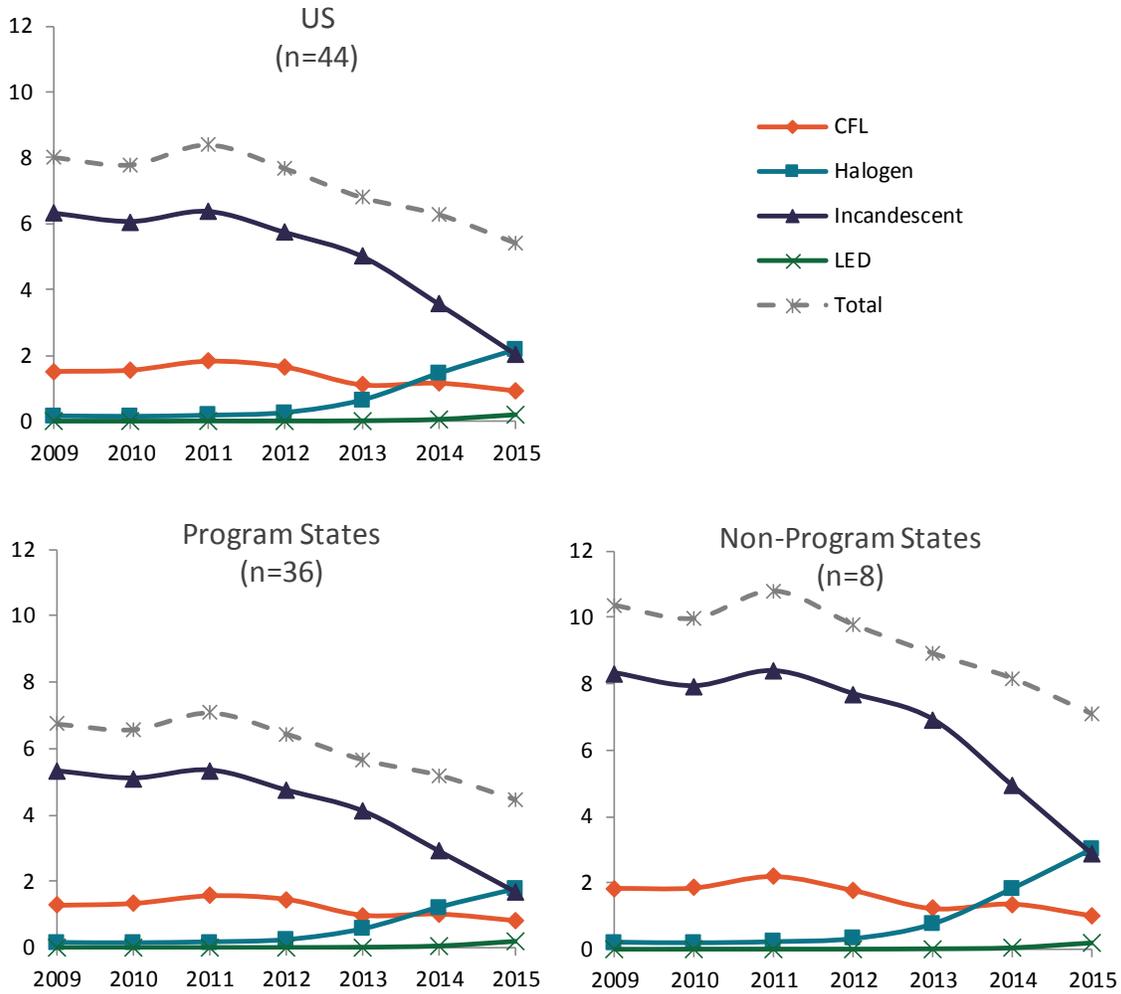
Total bulb sales have been on the decline since 2011. Since efficient bulbs last longer than inefficient bulbs, one would expect total sales to decline as saturation of bulbs that last longer than incandescents increases. Unfortunately, we do not have saturation rates for all the states included in the database, so we cannot assess the impact of saturation on the general bulb sales trends. One interesting finding is that households in program areas tend to buy fewer light bulbs per household overall than those in non-program areas. This may also relate to socket saturation, but could additionally reflect the sizes of homes and number of sockets in the two types of areas. Despite the differences in the number of purchases, ***all three charts show the same general trends: Incandescent sales declined starting in 2012, CFL sales declined slightly starting in 2012, halogen sales started to increase noticeably in 2013, and LED sales ticked up in 2015. Halogens began to outsell CFLs in 2013 and incandescents at the end of 2014.***

⁷ NMR Group. 2017. *Memorandum: RLPNC: 16-3 Lighting Decision Making*. See Figure 3. Bulbs Purchased by Channel. <http://ma-eeac.org/wordpress/wp-content/uploads/RLPNC-16-3-Lighting-Decision-Making-Memo.pdf>.

⁸ There are only eight non-program states (Alabama, Delaware, Kansas, Kentucky, Mississippi, Nebraska, Tennessee, and Virginia) in the IRI POS dataset. See **Error! Reference source not found.** for a complete listing of program and non-program states.

Figure 4: US, Program, and Non-Program Bulb Sales by Type per Household 2009-2015

(Channels: Grocery, Drug, Dollar, Discount, and Mass Merchandisers. 48% of MA Market)



As mentioned above, bulb sales trends are likely affected by saturation rates. While we lack such data for most states in the nation, Table 2 shows the saturation rates in MA and NY from 2009 to early 2016.^{9,10} Between 2009 and 2010, NY saw a larger increase in the saturation rate of CFLs, due in part to changes in its residential lighting program in that year. In 2013, saturation rates in NY and MA were similar, despite lack of support in NY for standard CFLs. In 2015 and 2016, saturation rates in NY for CFLs and LEDs fell below those of MA, likely because of the lack of any retail-based residential lighting program in the state.

Table 2: Saturation Rates in MA and NY, 2009 to Early 2016

Sockets Containing	2009	2010	2012	2013	2014	2015	2016
Massachusetts							
<i>Number of Households</i>	100	150	151	150	261	354	420
Incandescent	62%	57%	53%	55%	45%	43%	37%
CFLs	26%	26%	27%	28%	33%	32%	31%
Fluorescent	6%	9%	8%	9%	9%	9%	8%
Halogen	5%	7%	11%	5% ^c	6%	6%	8%
LEDs ¹	<1%	<1%	1%	2% ^{ab}	3%	6%	12%
Other ²	<1%	1%	-	2%	4%	4%	4% ^b
New York							
<i>Number of Households</i>	203	100	N/A	127	N/A	101	150
Incandescent	65%	57%	N/A	53%	N/A	51%	46%
CFLs	19%	24%	N/A	26%	N/A	22%	24%
Fluorescent	10%	12%	N/A	11%	N/A	12%	12%
Halogen	5%	6%	N/A	4% ^g	N/A	8%	8%
LEDs ¹	<1%	<1%	N/A	1% ^g	N/A	3% ^g	7% ^g
Other ²	N/A	N/A	N/A	5%	N/A	5%	5%

¹ The LED category includes both LED bulbs and integrated LED fixtures.

² Other includes xenon bulbs, metal halide, sodium, empty sockets, and unknown bulb types.

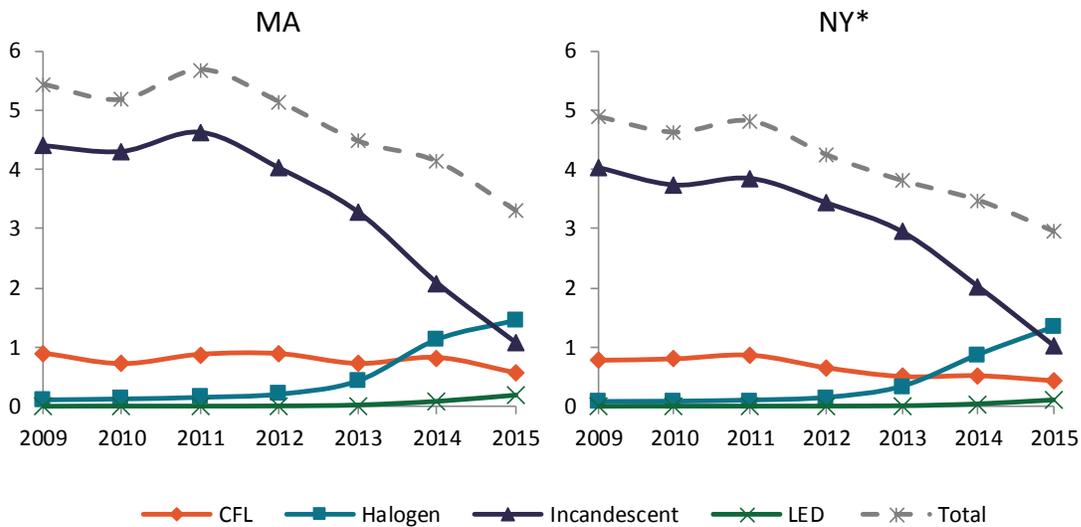
⁹ NMR collected 2016 market share from December 2015 to March 2016.

¹⁰ All MA and the three NY estimates from 2013 to 2016 are drawn from NMR Group. 2016. *2015-16 Lighting Market Assessment Consumer Survey and On-site Saturation Study*. Available at <http://ma-eeac.org/wordpress/wp-content/uploads/MA-2015-16-Lighting-Market-Assessment-Final-Report-08August2016.pdf>. NY estimates for 2009 and 2010 drawn from NMR Group. 2011. *IMPACT EVALUATION: NYSEDA CFL Expansion Program: Random Digit Dial and Onsite Survey Results*. Note that the 2009 and 2010 estimates include the entirety of NY State (minus New York City and Long Island). Data were not collected on other bulb types in NY in 2009 and 2010. Thus, while the bulb sales and market share estimates presented throughout this report include all of NY, the saturation estimates for all years include only portions of the state.

The bulb saturation trends do appear to have influenced sales in the two states: CFL sales in NY began to decline from their 2011 high, after which NY discontinued CFL incentives, while MA CFL sales, many of which included program incentives, remained relatively steady through 2015 (Figure 5). MA also saw a steeper decline of incandescent sales, but the incandescent sales per household had been higher in 2009 to 2011 in MA than in NY. Both states ended 2015 with about the same number of incandescent, halogen, and LED sales per household. In most other ways, the trends for MA and NY from 2009 to 2015 mirror those for the national and grouped program and non-program states: a drop in incandescent sales from their 2011 high, a rise in halogen sales from 2012, and the growth in LED sales starting in 2014.

Figure 5: MA and NY Bulb Sales by Type per Household 2009-2015

(Channels: Grocery, Drug, Dollar, Discount, and Mass Merchandisers. 48% of MA Market)



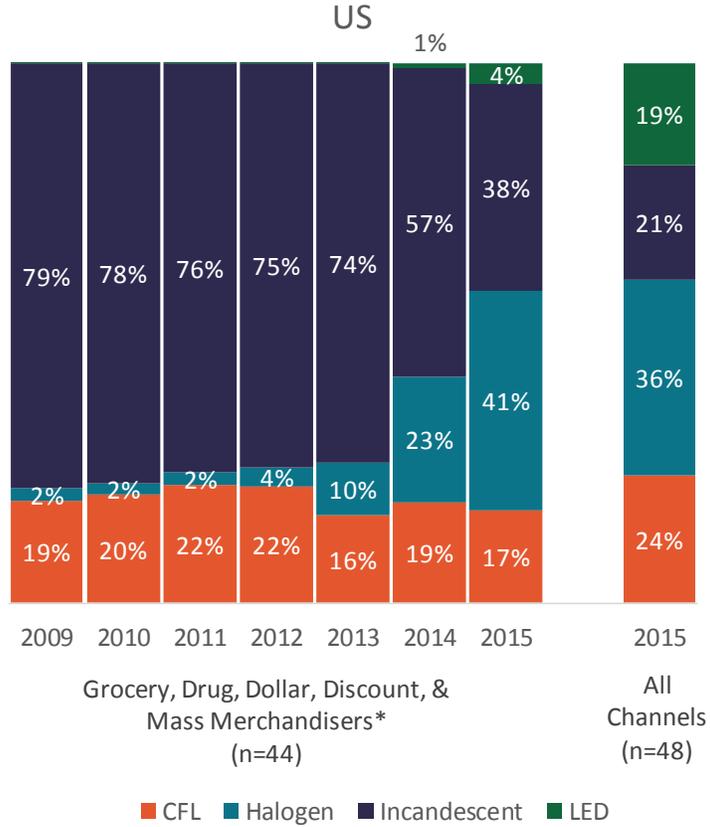
*Includes entire state of NY.

Market Share Trends

Figure 6 displays US market share from the grocery, drug, dollar, discount, and mass merchandiser channels for 2009 to 2015 and estimated market share for all channels for 2015. The data show a decrease in US CFL and incandescent market shares for bulbs sold through grocery, drug, dollar, discount, and mass merchandiser channels coinciding with an increase in halogen market share in 2013. Comparing the two estimates for 2015, the market shares for efficient bulbs sold through all channels is higher than that sold in the more limited set of channels. In 2015, efficient bulb (CFL and LED) market share in grocery, drug, dollar, discount, and mass merchandiser channels was 21%. In comparison, 2015 efficient bulb market share in all channels was 43%. Since efficient bulb market share increases when sales through hardware, home improvement, membership, lighting specialty, and online channels are added to sales through grocery, drug, dollar, discount, and mass merchandiser channels, it follows that ***efficient bulb sales are higher among the combination of hardware, home improvement, membership, lighting specialty, and online channels than among the combination of grocery, drug, dollar, discount, and mass merchandiser channels.***¹¹

¹¹ Appendix A contains more detailed comparisons of market share through the different combinations of retail channels included in the datasets.

Figure 6: US Market Share by Type 2009-2015



*The team is uncertain of the national percentage of the market covered by these channels, but it is approximately 48% of the MA market, according to the recent InfoScout survey.

Figure 7 displays market shares for program states and non-program states from the same sources as Figure 6. Both program and non-program states reveal the same general trends identified for the total US market. However, efficient bulbs (CFLs and LEDs) have historically represented slightly larger proportions of market share in program states compared to non-program states. Efficient bulb market share in grocery, drug, dollar, discount, and mass merchandiser channels in program states increased by three percentage points, from 19% in 2009 to 22% in 2015. During the same period, efficient bulb market share in these channels in non-program states declined by one percentage point, from 18% in 2009 to 17% in 2015. Additionally, halogen market share increased by a larger proportion in non-program states (40 percentage points) than in program states (38 percentage points), and incandescent sales dropped 40 percentage points in both groups of states. The point estimates for all channels show program states having a much larger LED market share (20% vs. 9%), larger CFL market share (25% vs. 17%), and smaller incandescent and halogen market shares (20% and 35% vs. 31% and 43%). **The increase in efficient bulb market share among program states relative to non-program states—and the slightly smaller increase in halogen sales—plus the higher point estimates of efficient bulb share for 2015 for all channels suggest that lighting programs have motivated consumers, at least among purchases within the grocery/discount stores, to purchase energy-efficient light bulbs over the last seven years.**

Figure 7: Program and Non-Program Market Share by Type 2009-2015

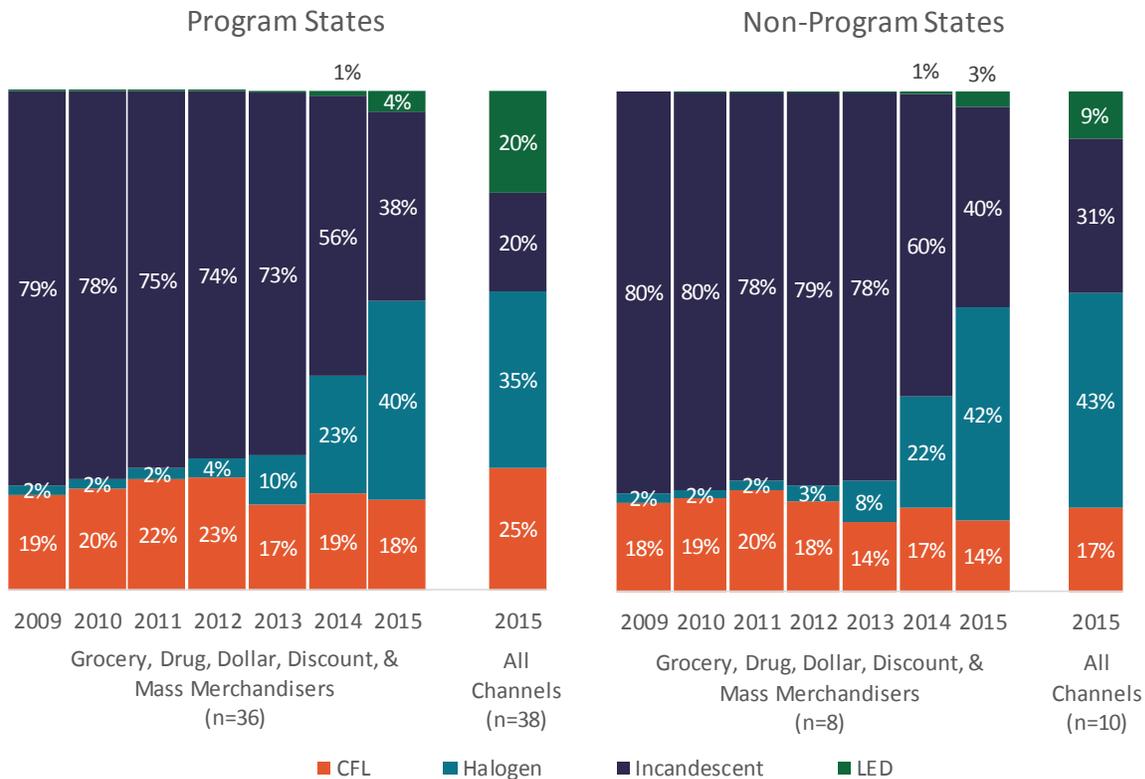


Figure 8 displays the average efficient bulb (CFL and LED) market share among each of the following in 2015: 1) states with no lighting programs, 2) states that spent up to two dollars per household on lighting programs, 3) states that spent two to five dollars per household on lighting programs, 4) states that spent over five dollars per household on lighting programs (which includes MA). As one might expect, **states that spent more money on lighting programs had higher combined CFL and LED market shares in 2015.**

Figure 8: 2015 CFL + LED Market Share by Program Spending per Household
(All Channels. 100% of Market)

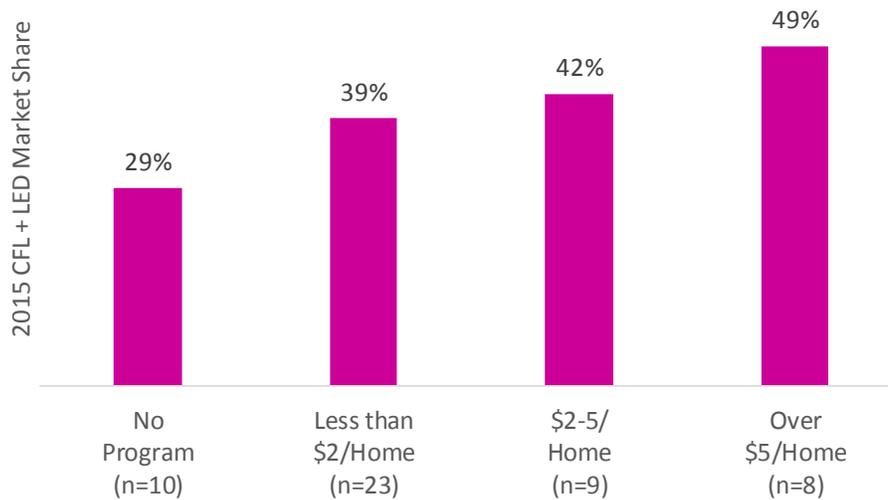


Figure 9 displays MA and non-program state market shares over time from 2009 to 2015 for the grocery, drug, dollar, discount, and mass merchandiser channels and for 2015 for all channels. MA has seen its LED market share increase to 6% compared to 3% for non-program states, and it has retained a greater CFL market share over time. While halogen market share in MA and non-program states is similar (44% vs. 40% for the selected channels and 40% vs. 43% for all channels), incandescent market share declined at a much faster rate and ended 2015 much lower in MA than in non-program areas (33% vs. 40% for selected channels and 18% vs. 31% for all channels). **The data suggest that MA program activity has led to higher and sustained adoption of energy-efficient bulbs compared to non-program areas.**

Figure 10 displays MA and NY market shares over time for the selected channels and for 2015 for all channels. *MA has tended to have somewhat higher efficient bulb share (CFLs and LEDs combined) in grocery/discount channels since 2012 compared to NY, largely driven by the higher CFL market share in MA.* MA CFL market share exceeded NY CFL market share in these channels from 2013 to 2015, which coincides with the period in which NY was not offering incentives for standard CFLs (after 2011) and ceased doing so for all other bulbs (after 2014). NY LED market share appears to be lagging behind MA LED market share.

According to these data, market share for efficient bulbs sold through all channels in 2015 was higher in NY (45%) than in MA (42%). In 2015, LED market share in MA (19%) was slightly larger than in NY (15%), while CFL market share in MA (23%) was somewhat *smaller than in NY (30%)*. Incandescent and halogen market shares were slightly higher in MA (18% and 40%) than in NY (16% and 39%). *Thus, the all-channel point estimates for 2015 market shares for NY and MA point to a less optimistic conclusion about the influence of the MA residential lighting program on energy-efficient bulb adoption. Importantly, this is one of the few findings that contradicts the more common pattern in the data of a positive program impact on energy-efficient market share.*

Figure 9: MA Market Share by Type 2009-2015

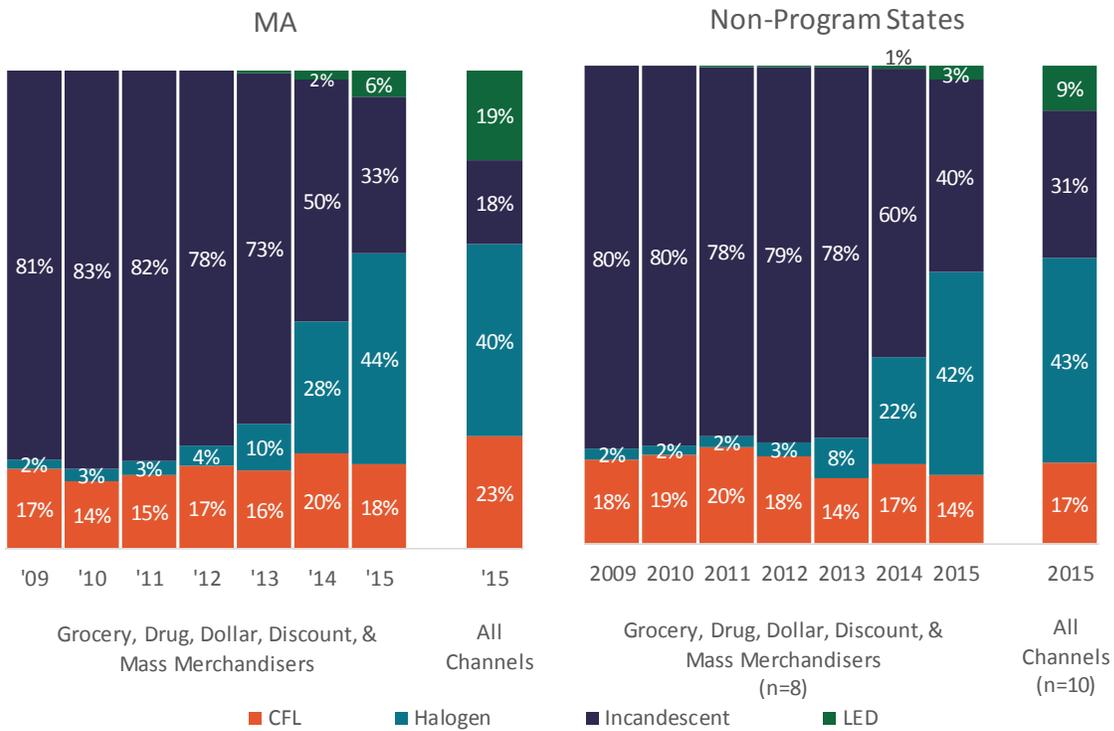
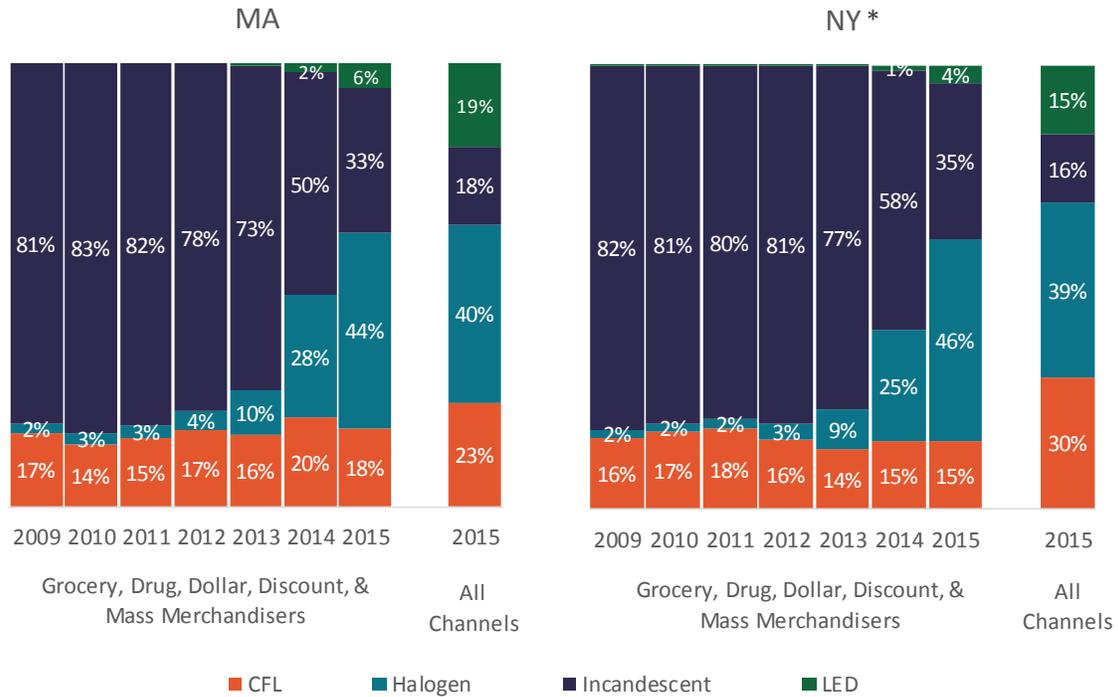


Figure 10: MA and NY 2009-2015 Market Share



*Includes entire state of NY.

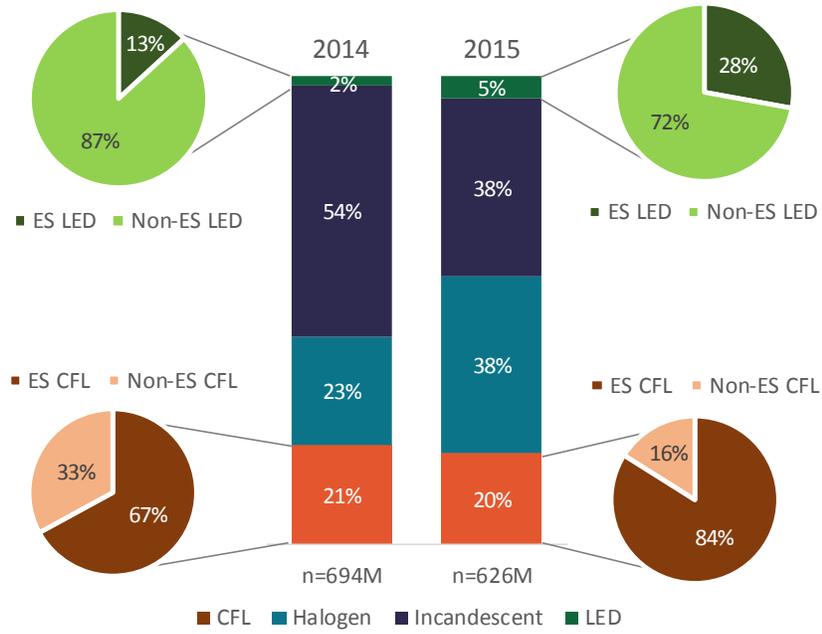
ENERGY STAR Qualified Bulbs

Figure 11 displays estimates of market share for all bulb types, but the focus of this graph is on the proportions of LEDs and CFLs sold in the US that were ENERGY STAR qualified at the time of the sale.¹² It should be noted that ENERGY STAR qualification is based on Version 1.2. The percentage of LEDs sold throughout the US that were ENERGY STAR certified increased from 13% to 28% between 2014 and 2015. The percentage of CFLs sold that were ENERGY STAR certified increased from 67% to 84%.

¹² As mentioned above, the estimates of market share differ from those reported above, likely due to differences in data cleaning and weighting applied by third-party vendors.

Figure 11: US 2014-2015 Energy Star Market Share

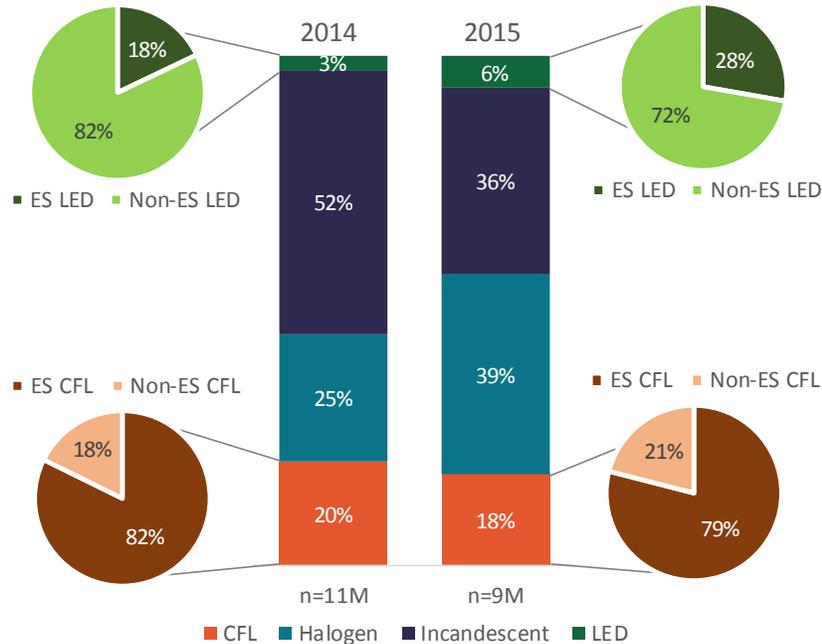
(Channels: Grocery, Drug, Dollar, Discount, and Mass Merchandisers. 48% of MA Market)



In MA, the percentage of LEDs sold that were ENERGY STAR certified increased from 18% to 28%; however, the percentage of CFLs sold that were ENERGY STAR certified in MA decreased from 82% to 79%.

Figure 12: MA 2014-2015 Energy Star Market Share

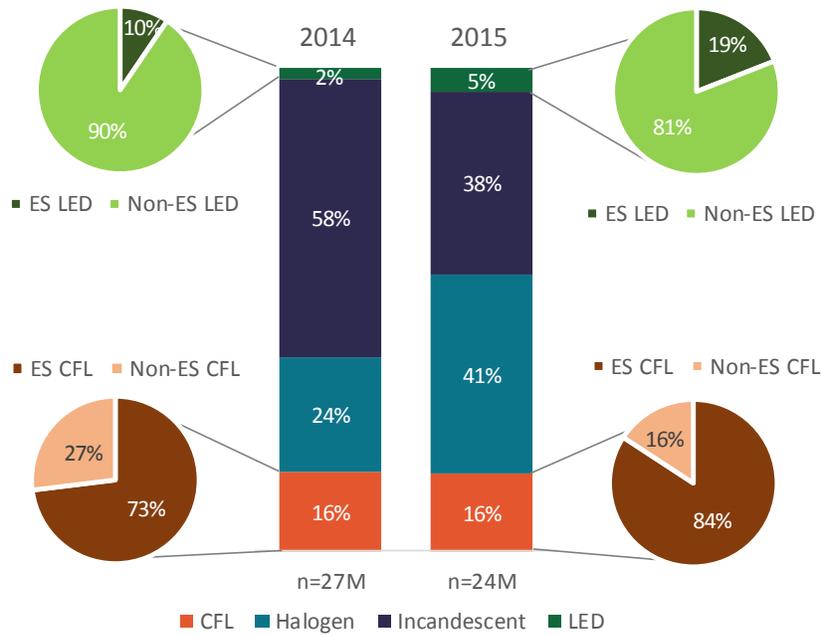
(Channels: Grocery, Drug, Dollar, Discount, and Mass Merchandisers. 48% of Market)



Between 2014 and 2015, the percentage of LEDs sold in NY that were ENERGY STAR certified increased from 10% to 19%. **A smaller proportion of the LEDs sold in NY in 2014 (10%) and 2015 (19%) were ENERGY STAR certified than in MA (18% and 28%, respectively).** Recall that NY lacks any incentives. In contrast to LEDs, **the percentage of CFLs sold in NY that were ENERGY STAR certified increased from 73% in 2014 to 84% in 2015. Moreover, a smaller proportion of 2015 CFLs sold in MA (79%) were ENERGY STAR certified than in NY (84%).** This finding is one of the few that points to less of a program impact for the MA residential lighting program compared to most other findings, which suggest it boosted energy-efficient market share of ENERGY STAR bulbs.

Figure 13: NY 2014-2015 Energy Star Market Share

(Channels: Grocery, Drug, Dollar, Discount, and Mass Merchandisers. 48% of MA Market)



*Includes entire state of NY.

NEMA Shipments Q1 2011 to Q3 2016

NMR has also been tracking NEMA lamp indices and shipments.¹³ This short section updates market share based on shipments to those manufacturers who report them to the organization. *In Q2 2016, LEDs posted their first decline in market share (from 27% in Q1 to 21% in Q2) since NEMA began tracking them in Q1 2011, and incandescents posted their first increase in market share (9% in Q1 to 13% in Q2) since Q1 2014. However, during the following quarter, LEDs rebounded (from 21% in Q2 to 32% in Q3) and incandescents dropped (from 13% in Q2 to 10% in Q1).* Halogens’ market share increased (from 45% in Q1 to 51% in Q2), then returned to its Q1 level. The trend for CFLs remained the same, decreasing to 12% in Q3 2016. Figure 14 and Figure 15 present the shipment market share trends in two different ways. Figure 14 shows a simple line graph of each bulb’s market share over time, highlighting the change in trends for incandescents and halogens. Figure 15 displays the same data, but as an area graph summing to 100% of the market, highlighting the long-term market shift to halogens and LEDs, even as it shows the impact of the volatility in the most recent quarters.

¹³ Unlike the other data sources, NEMA reports only A-line bulbs and excludes specialty shapes.

Figure 14: Shipment Market Share Q1 2011 to Q3 2016, Line Graph
(All Channels. 100% of Market)

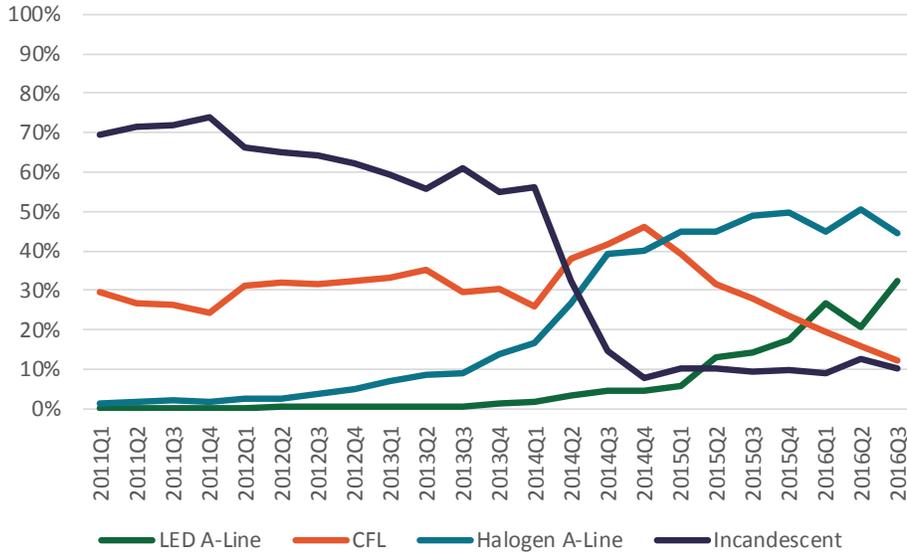
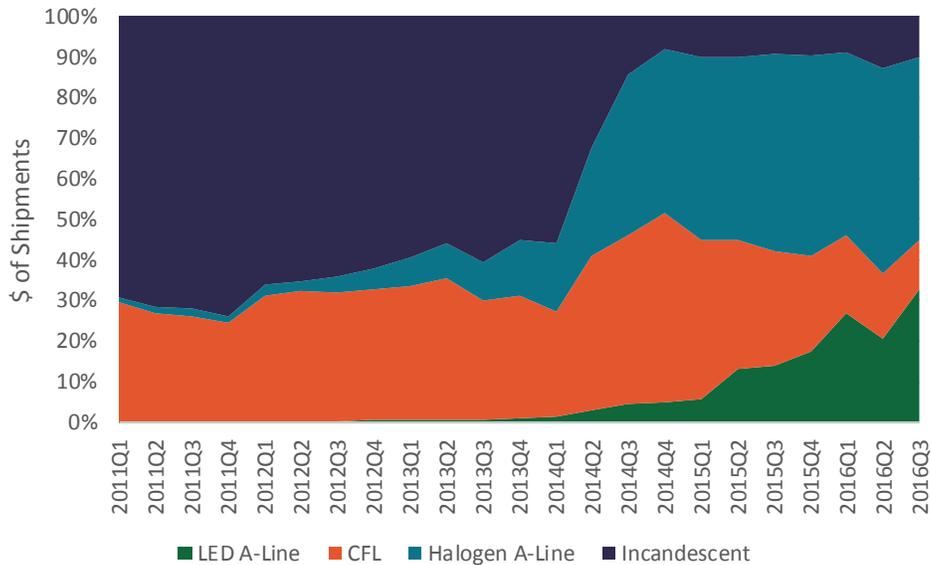


Figure 15: Shipment Market Share Q1 2011 to Q3 2016, Area Graph
(All Channels. 100% of Market)



Suggestions and Next Steps

The RLPNC evaluation team has several studies in progress that relate to the same questions addressed in the current memo: market share, bulb sales, and the direction of the lighting market overall. These studies include 16-1 Market Adoption Model, 16-2 Supplier Interview, 16-6 Shelf Stocking Surveys, and 16-7 On-site Saturation Study. The team refrains from making recommendations until the results of each of these studies is available and can be considered in the context of the full body of work.

The team does make the following suggestions regarding continued purchase and review of various CREED residential lighting datasets. The PAs have adopted these suggestions.

- **Suggestion 1: Continue to purchase IRI POS and IRI Panel Data for all states. Cost: \$35,000 for Panel and \$27,000 for POS.**

The benefit of the IRI POS time series outweighs the weakness of the lack of certain channels and the lack of ENERGY STAR qualification flags; likewise, the inclusion of all channels coupled with the ability to perform in-depth data review, cleaning, and analysis outweighs some of the eccentricities of the IRI panel data, including the lack of ENERGY STAR bulb identification.

- **Suggestion 2: Continue to purchase Nielsen POS data for the nation, MA, and NY. Cost: \$9,000 for MA, NY, and US.**

The Nielsen POS data provide one important improvement over the IRI POS data: the identification of ENERGY STAR qualified bulbs. Given the implications of the ENERGY STAR 2.0 Specification on CFLs and LEDs—and manufacturers' commitment to the continued sale of non-ENERGY STAR qualified models of both bulb types—tracking this variable will be imperative over the next few years.

- **Suggestion 3: Purchase Nielsen panel data if Nielsen can provide detailed data that would allow for more in-depth cleaning and analysis and a more thorough assessment of ENERGY STAR qualification. Cost: \$4,000 for MA, NY, and US.**

The team found little benefit in using the Nielsen panel data as they were delivered to NMR, particularly given the outlying estimate of incandescent market share. The data also lacked information on ENERGY STAR qualification. NMR provided Nielsen with a list of ENERGY STAR qualified models from the Nielsen POS data, but Nielsen matched very few bulbs. In the future, NMR may also be able to provide ENERGY STAR information from web scraping and shelf stocking, but this assumes we have the same UPCs in the dataset, as Nielsen only reports UPCs and not model or SKU numbers. NMR only recommends purchasing Nielsen panel data if Nielsen and CREED agree upon more detailed data delivery that allow for data review and cleaning and a more thorough assessment of ENERGY STAR qualification.

The next steps for this study include the PAs and EEAC consultants deciding whether to purchase 2016 CREED data and for which datasets. NMR will continue to track NEMA shipment data and provide updates when they are available. In March and April, the team

will compile all available evaluation results to make recommendations to the PAs regarding the lighting market and the PAs' role in it.

Appendix A Strengths and Weaknesses of the Sales Datasets

The creation of CREED and its ability to secure national and state-level sales data for its members represents a tremendous boon to program administrators. Prior to CREED, the MA and other PAs rarely had access to market-level bulb sales data, as manufacturers and retailers asserted that sharing such data could inadvertently provide too much information to their competitors. Through its LightTracker Initiative, CREED has provided numerous PAs with access to critical sales data to help them assess the impact of their programs in the rapidly changing lighting market. The datasets CREED has obtained, however, have numerous strengths and weaknesses, as outlined below.

Turning first to the strengths and weaknesses of the POS versus panel data, the POS datasets include detailed product descriptions, allowing for more thorough accuracy checks and data cleaning than the panel datasets (particularly the Nielsen panel), but the panel data include all retail channels. That is, while the POS data include sales for grocery, drug, dollar, club, and mass market retail channels, they lack sales data for hardware, home improvement, some membership, lighting specialty retail channels, and all online sales. Hardware and home improvement stores collectively account for 38% of retail bulb sales in MA, according to the most recently completed market assessment.¹⁴ The panel datasets include these channels, but they rely on people who volunteer to take part and get paid to do so. Individuals likely vary in how diligent they are in scanning the UPCs of their purchases. The POS datasets are likely a more accurate description of sales among the reporting retailers, but the panel data cover more retail channels.

Regarding the strengths and weaknesses of IRI versus Nielsen, one advantage of the IRI POS dataset is that the Massachusetts PAs have previously purchased the same dataset for 2009 to 2014; the latest purchase adds 2015 to the time series, allowing for the identification of trends over seven years. The Nielsen POS dataset allows for the distinction between ENERGY STAR and non-ENERGY STAR products. Both POS datasets include several private label bulbs, which limits the amount of information available about their characteristics, but Nielsen has a greater proportion of these bulbs. Approximately 10% of the IRI POS sales and 36% of the Nielsen POS sales represented private label light bulbs.

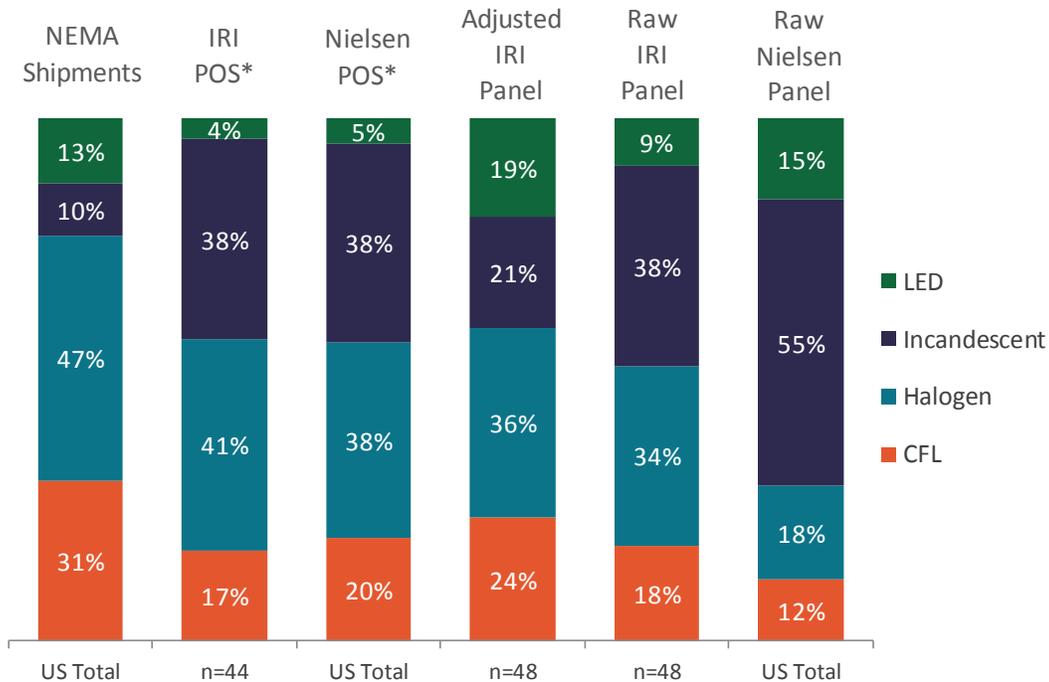
Each dataset also exhibited internal discrepancies. Since the panel datasets represent sales from all retail channels and the POS datasets represent sales from only a subset of retail channels, one would expect total sales in the panel datasets to exceed total sales in the POS datasets. However, total sales in the panel datasets fell below those of the POS datasets. To correct for this, the team adjusted the IRI panel data, drawing on such information as NEMA shipments and the total square feet of POS retailers by state, among

¹⁴ NMR Group, Inc. 2016. *2015-16 Lighting Market Assessment Consumer Survey and On-site Saturation Study: Final*. Delivered July 29, 2016. Available at <http://ma-eeac.org/wordpress/wp-content/uploads/MA-2015-16-Lighting-Market-Assessment-Final-Report-08August2016.pdf>.

other factors. The same issue also arose in the Nielsen data; however, NMR opted not to expend the time and budget necessary to true-up the Nielsen panel data with the Nielsen POS data because the Nielsen panel data not did distinguish ENERGY STAR and non-ENERGY STAR qualified bulbs. Without this benefit, we did not believe the Nielsen panel data presented adequate improvements over the IRI panel data to justify the additional expenditures needed to adjust them.

Figure 16 **Error! Reference source not found.** displays 2015 US market share by bulb type from each of the four unadjusted datasets in addition to the adjusted IRI dataset and NEMA shipment dataset. Again, the POS datasets include sales reported by retailers of a subset of retail channels (grocery, drug, dollar, discount, and mass merchandiser channels), while the panel datasets include purchases scanned by panelists shopping at all retail channels. NEMA data are based on surveys of member manufacturers. The two POS datasets are quite similar to each other. The panel datasets have a larger proportion of LED sales and a smaller proportion of halogen sales than the POS datasets. The Nielsen panel has a much larger proportion of incandescent bulbs than the team believes is characteristic of the actual market. Adjusting the IRI panel dataset increases the proportion of LEDs, CFLs, and halogen bulbs, while decreasing the proportion of incandescent bulbs. The NEMA shipment market share data additionally contrast with the others, generally suggesting smaller market share of incandescents and higher shares of all other bulb types compared to those suggested by the sales data sources.

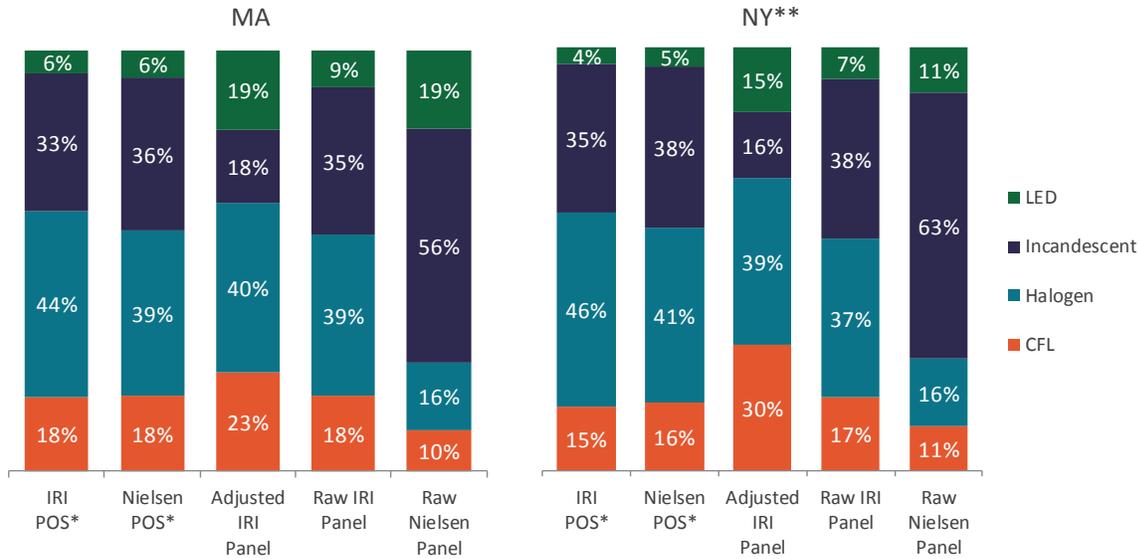
Figure 16: 2015 US Market Share by Bulb Type



*Excludes hardware, home improvement, some membership, lighting specialty retail channels, and all online sales. Resulting sales represent about 48% of Massachusetts market.

Figure 17 **Error! Reference source not found.** displays 2015 market share by bulb type from each of the four sales datasets for Massachusetts and New York. As in Figure 16 **Error! Reference source not found.**, the two POS datasets (which lack hardware, home improvement, lighting specialty, and some membership stores) are similar, the panel datasets (which include all channels) show higher proportions of LEDs, and the Nielsen panel incandescent market share is inexplicably large.

Figure 17: 2015 MA and NY Market Share by Bulb Type

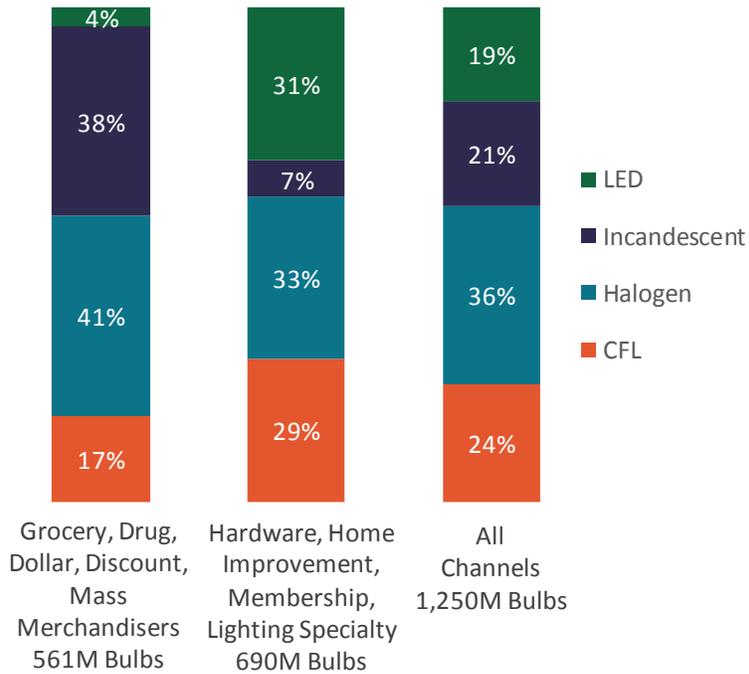


*Excludes hardware, home improvement, some membership, lighting specialty retail channels, and all online sales. Resulting sales represent about 48% of Massachusetts market.

**Includes entire state of NY.

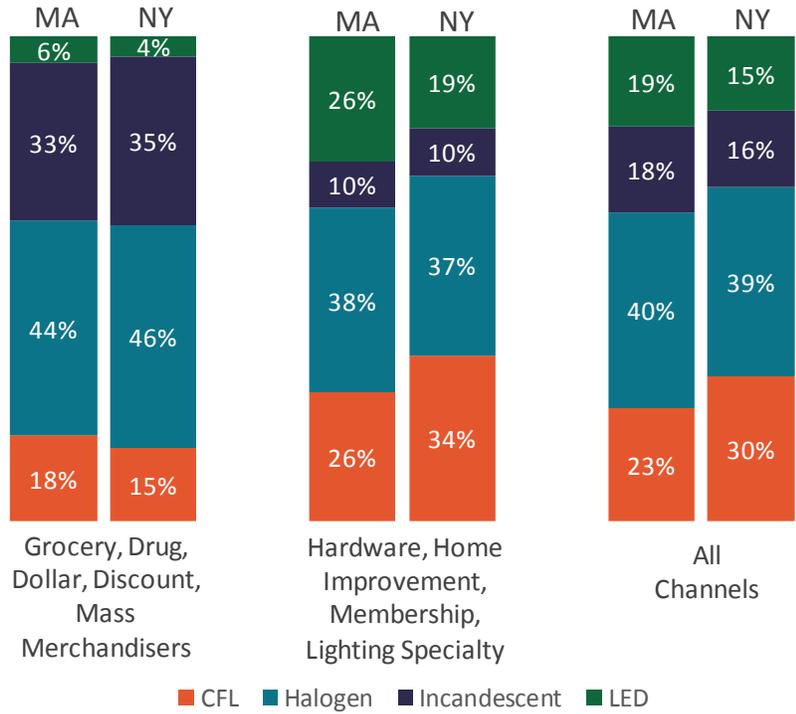
To tease out the impact of the inclusion of different channels, the CREED Initiative created market share from the panel data by separating sales reported in the channels in the POS data from the Adjusted IRI panel sales. Figure 18 **Error! Reference source not found.** shows that in 2015, larger proportions of LEDs and CFLs were sold in the US through the hardware, home improvement, membership, and lighting specialty retail channels combined (31% and 29%, respectively) than through the grocery, drug, dollar, discount, and mass merchandiser channels combined (4% and 17%, respectively).

Figure 18: 2015 US Market Share by Retail Channels



Similarly, Figure 19 **Error! Reference source not found.** shows that in 2015, larger proportions of efficient bulbs were sold in MA and NY through the combination of hardware, home improvement, membership, and lighting specialty retail channels than through the combination of grocery, drug, dollar, discount, and mass merchandiser channels.

Figure 19: 2015 MA and NY* Market Share by Retail Channels



* Includes entire state of NY.

Appendix B Program and Non-Program States Included in the IRI Datasets

Program States	Non-Program States
Arizona	Alabama
Arkansas	Delaware
California	Kansas
Colorado	Kentucky
Connecticut	Mississippi
Florida	Montana*
Georgia	Nebraska
Idaho	North Dakota*
Illinois	Tennessee
Indiana	Virginia
Iowa*	
Louisiana	
Maine	
Maryland	
Massachusetts	
Michigan	
Minnesota	
Missouri	
Nevada	
New Hampshire	
New Jersey	
New Mexico	
New York	
North Carolina	
Ohio	
Oklahoma	
Oregon	
Pennsylvania	
Rhode Island	
South Carolina	
South Dakota	
Texas*	
Utah	
Vermont	
Washington	
West Virginia	
Wisconsin	
Wyoming	

*State present in the IRI panel dataset but not in the IRI POS dataset.